

ABSTRACT

A direct-write method for fabricating magnetic nanostructures, including hard magnetic nanostructures of barium hexaferrite, BaFe, based on nanolithographic printing and a sol-gel process. This method utilizes a conventional atomic force microscope tip, coated with a magnetic material precursor solution, to generate patterns that can be post-treated at elevated temperature to generate magnetic features consisting of barium ferrite in its hexagonal magnetoplumbite (M-type) structure. Features ranging from several hundred nm down to below 100 nm were generated and studied using AFM, magnetic force microscopy, and X-ray photoelectron spectroscopy. The approach offers a new way for patterning functional inorganic magnetic nanostructures with deliberate control over feature size and shape, as well as interfeature distance and location.